humans, cattle, pigs, mice, rabbits, and sheep (Zanetti *et al.*, *FEBS Lett. 374:*1, 1995), vertebrate defensins, such as human neutrophil defensins [HNP 1-4], paneth cell defensins of mouse and human small intestine (Oulette and Selsted, *FASEB J. 10:*1280, 1996; Porter *et al.*, *Infect. Immun. 65:*2396, 1997), vertebrate β-defensins, such as HBD-1 of human epithelial cells (Zhao *et al.*, *FEBS Lett. 368:*331, 1995), HBD-2 of inflamed human skin (Harder *et al.*, *Nature 387:*861, 1997), bovine β-defensins (Russell *et al.*, *Infect. Immun. 64:*1565, 1996), plant defensins, such as Rs-AFP1 of radish seeds (Fehlbaum *et al.*, *J. Biol. Chem. 269:*33159, 1994), α - and β-thionins (Stuart *et al.*, *Cereal Chem. 19:*288, 1942; Bohlmann and Apel, *Annu. Rev. Physiol. Plant Mol. Biol. 42:*227, 1991), γ-thionins (Broekaert *et al.*, *Plant Physiol. 108:*1353, 1995), the anti-fungal drosomycin (Fehlbaum *et al.*, *J. Biol. Chem. 269:*33159, 1994), apidaecins, produced by honey bee, bumble bee, cicada killer, hornet, yellow jacket, and wasp (Casteels *et al.*, *J. Biol. Chem. 269:*26107, 1994; Levashina *et al.*, *Eur. J. Biochem. 233:*694, 1995), cathelicidins, such as indolicidin from bovine neutrophils (Falla *et al.*, *J. Biol. Chem. 277:*19298, 1996), bacteriocins, such as nisin (Delves-Broughton *et al.*, *Antonie van Leeuwenhoek J. Microbiol. 69:*193, 1996), and the protegrins and tachyplesins, which have antifungal, antibacterial and antiviral activities (Tamamura *et al.*, *Biochim. Biophys. Acta 1163:*209, 1993; Aumelas *et al.*, *Eur. J. Biochem. 237:*575, 1996; Iwanga *et al.*, *Ciba Found. Symp. 186:*160, 1994). Illustrative cationic peptides are listed in Table 1.

TABLE 1

ILLUSTRATIVE CATIONIC PEPTIDES**

Group Name	Peptide	Sequence	SEQ ID	Reference*
Abaecins	Abaecin	YVPLPNVPQPGRRPFPTF PGQGPFNPKIKWPQGY	37	Casteels *et al.* (1990)
Andropins	Andropin	VFIDILDKVENAIHNAAQ VGIGFAKPFEKLINPK	38	Samakovlis *et al.* (1991)
Apidaecins	Apidaecin IA	GNNRPVYIPQPRPPHPRI	39	Casteels *et al.* (1989)
	Apidaecin IB	GNNRPVYIPQPRPPHPRL	40	Casteels *et al.* (1989)
	Apidaecin II	GNNRPIYIPQPRPPHPRL	41	Casteels *et al.* (1989)
AS	AS-48	7.4 kDa		Galvez *et al.* (1989)
Bactenecins	Bactenecin	RLCRIVVIRVCR	42	Romeo *et al.* (1988)

Group Name	Peptide	Sequence	SEQ ID	Reference*
Bac	Bac5	RFRPPIRRPPIRPPFYPPFRPPIRPPI FPPIRPPFRPPLRFP	43	Frank *et al.* (1990)
	Bac7	RRIRPRPPRLPRPRPRPLPFPRPGP RPIPRPLPFPRPGPRPIPRPLPFPRP GPRPIPRP	44	Frank *et al.* (1990)
Bactericidins	Bactericidin B2	WNPFKELERAGQRVRDAVISAA PAVATVGQAAAAIARG*	45	Dickinson *et al.* (1988)
	Bactericidin B-3	WNPFKELERAGQRVRDAIISAGP AVATVGQAAAAIARG	46	Dickinson *et al.* (1988)
	Bactericidin B-4	WNPFKELERAGQRVRDAIISAAP AVATVGQAAAAIARG*	47	Dickinson *et al.* (1988)
	Bactericidin B-5P	WNPFKELERAGQRVRDAVISAA AVATVGQAAAAIARGG*	48	Dickinson *et al.* (1988)
Bacteriocins	Bacteriocin C3603	4.8 kDa		Takada *et al.* (1984)
	Bacteriocin IY52	5 kDa		Nakamura *et al.* (1983)
Bombinins	Bombinin	GIGALSAKGALKGLAKGLAZHF AN*	49	Csordas and Michl (1970)
	BLP-1	GIGASILSAGKSALKGLAKGLAE HFAN*	50	Gibson *et al.* (1991)
	BLP-2	GIGSAILSAGKSALKGLAKGLAE HFAN*	51	Gibson *et al.* (1991)
Bombolitins	Bombolitin BI	IKITTMLAKLGKVLAHV*	52	Argiolas and Pisano (1985)
	Bombolitin BII	SKITDILAKLGKVLAHV*	53	Argiolas and Pisano (1985)
BPTI	Bovine Pancreatic Trypsin Inhibitor (BPTI)	RPDFCLEPPYTGPCKARIIRYFYN AKAGLCQTFVYGGCRAKRNNF KSAEDCMRTCGGA	54	Creighton and Charles (1987)
Brevinins	Brevinin-1E	FLPLLAGLAANFLPKIFCKITRKC	55	Simmaco *et al.* (1993)
	Brevinin-2E	GIMDTLKNLAKTAGKGALQSLL NKASCKLSGQC	56	Simmaco *et al.* (1993)
Cecropins	Cecropin A	KWKLFKKIEKVGQNIRDGIIKAG PAVAVVGQATQIAK*	57	Gudmundsson *et al.* (1991)
	Cecropin B	KWKVFKKIEKMGRNIRNGIVKA GPAIAVLGEAKAL*	58	Xanthopoulos *et al.* (1988)
	Cecropin C	GWLKKLGKRIERIGQHTRDATIQ GLGIAQQAANVAATARG*	59	Tryselius *et al.* (1992)
	Cecropin D	WNPFKELEKVGQRVRDAVISAG PAVATVAQATALAK*	60	Hultmark *et al.* (1982)
	Cecropin P_1	SWLSKTAKKLENSAKKRISEGIA IAIQGGPR	61	Lee *et al.* (1989)
Charybdtoxins	Charybdtoxin	ZFTNVSCTTSKECWSVCQRLHN TSRGKCMNKKCRCYS	62	Schweitz *et al.* (1989)
Coleoptericins	Coleoptericin	8.1 kDa		Bulet *et al.* (1991)
Crabrolins	Crabrolin	FLPLILRKIVTAL*	63	Argiolas and Pisano (1984)
α-Defensins	Cryptdin 1	LRDLVCYCRSRGCKGRERMNGT CRKGHLLYTLCCR	64	Selsted *et al.* (1992)
	Cryptdin 2	LRDLVCYCRTRGCKRRERMNGT CRKGHLMYTLCCR	65	Selsted *et al.* (1992)
	MCP1	VVCACRRALCLPRERRAGFCRIR GRIHPLCCRR	66	Selsted *et al.* (1983)

Group Name	Peptide	Sequence	SEQ ID	Reference*
	MCP2	VVCACRRALCLPLERRAGFCR IRGRIHPLCCRR	67	Ganz *et al.* (1989)
	GNCP-1	RRCICTTRTCRFPYRRLGTCIF QNRVYTFCC	68	Yamashita and Saito (1989)
	GNCP-2	RRCICTTRTCRFPYRRLGTCLF QNRVYTFCC	69	Yamashita and Saito (1989)
	HNP-1	ACYCRIPACIAGERRYGTCIYQ GRLWAFCC	70	Lehrer *et al.* (1991)
	HNP-2	CYCRIPACIAGERRYGTCIYQG RLWAFCC	71	Lehrer *et al.* (1991)
	NP-1	VVCACRRALCLPRERRAGFCR IRGRIHPLCCRR	72	Ganz *et al.* (1989)
	NP-2	VVCACRRALCLPLERRAGFCR IRGRIHPLCCRR	73	Ganz *et al.* (1989)
	RatNP-1	VTCYCRRTRCGFRERLSGACG YRGRIYRLCCR	74	Eisenhauer *et al.* (1989)
	RatNP-2	VTCYCRSTRCGFRERLSGACG YRGRIYRLCCR	75	Eisenhauer *et al.* (1989)
β-Defensins	BNBD-1	DFASCHTNGGICLPNRCPGHM IQIGICFRPRVKCCRSW	76	Selsted et at. (1993)
	BNBD-2	VRNHVTCRINRGFCVPIRCPGR TRQIGTCFGPRIKCCRSW	77	Selsted *et al.* (1993)
	TAP	NPVSCVRNKGICVPIRCPGSM KQIGTCVGRAVKCCRKK	78	Diamond *et al.* (1991)
Defensins-insect	Sapecin	ATCDLLSGTGINHSACAAHCL LRGNRGGYCNGKAVCVCRN	79	Hanzawa *et al.* (1990)
	Insect defensin	GFGCPLDQMQCHRHCQTITGR SGGYCSGPLKLTCTCYR	80	Bulet *et al.* (1992)
Defensins-scorpion	Scorpion defensin	GFGCPLNQGACHRHCRSIRRR GGYCAGFFKQTCTCYRN	81	Cociancich *et al.* (1993)
Dermaseptins	Dermaseptin	ALWKTMLKKLGTMALHAGK AALGAADTISQTQ	82	Mor *et al.* (1991)
Diptericins	Diptericin	9 kDa		Reichhardt *et al.* (1989)
Drosocins	Drosocin	GKPRPYSPRPTSHPRPIRV	83	Bulet *et al.* (1993)
Esculentins	Esculentin	GIFSKLGRKKIKNLLISGLKNV GKEVGMDVVRTGIDIAGCKIK GEC	84	Simmaco *et al.* (1993)
Indolicidins	Indolicidin	ILPWKWPWWPWRR*	85	Selsted *et al.* (1992)
Lactoferricins	Lactoferricin B	FKCRRWQWRMKKLGAPSITC VRRAF	86	Bellamy *et al.* (1992b)
Lantibiotics	Nisin	ITSISLCTPGCKTGALMGCNM KTATCHCSIHVSK	87	Hurst (1981)
	Pep 5	TAGPAIRASVKQCQKTLKATR LFTVSCKGKNGCK	88	Keletta *et al.* (1989)
	Subtilin	MSKFDDFDLDVVKVSKQDSKI TPQWKSESLCTPGCVTGALQT CFLQTLTCNCKISK	89	Banerjee and Hansen (1988)
Leukocins	Leukocin A-val 187	KYYGNGVHCTKSGCSVNWGE AFSAGVHRLANGGNGFW	90	Hastings *et al.* (1991)
Magainins	Magainin I	GIGKFLHSAGKFGKAFVGEIM KS*	91	Zasloff (1987)

Group Name	Peptide	Sequence	SEQ ID	Reference*
	Magainin II	GIGKFLHSAKKFGKAFVGEIM NS*	92	Zasloff (1987)
	PGLa	GMASKAGAIAGKIAKVALKA L*	93	Kuchler *et al.* (1989)
	PGQ	GVLSNVIGYLKKLGTGALNA VLKQ	94	Moore *et al.* (1989)
	XPF	GWASKIGQTLGKIAKVGLKE LIQPK	95	Sures and Crippa (1984)
Mastoparans	Mastoparan	INLKALAALAKKIL*	96	Bernheimer and Rudy (1986)
Melittins	Melittin	GIGAVLKVLTTGLPALISWIK RKRQQ	97	Tosteson and Tosteson (1984)
Phormicins	Phormicin A	ATCDLLSGTGINHSACAAHCL LRGNRGGYCNGKGVCVCRN	98	Lambert *et al.* (1989)
	Phormicin B	ATCDLLSGTGINHSACAAHCL LRGNRGGYCNRKGVCVRN	99	Lambert *et al.* (1989)
Polyphemusins	Polyphemusin I	RRWCFRVCYRGFCYRKCR*	100	Miyata *et al.* (1989)
	Polyphemusin II	RRWCFRVCYKGFCYRKCR*	101	Miyata *et al.* (1989)
Protegrins	Protegrin I	RGGRLCYCRRRFCVCVGR	102	Kokryakov *et al.* (1993)
	Protegrin II	RGGRLCYCRRRFCICV	103	Kokryakov *et al.* (1993)
	Protegrin III	RGGGLCYCRRRFCVCVGR	104	Kokryakov *et al.* (1993)
Royalisins	Royalisin	VTCDLLSFKGQVNDSACAAN CLSLGKAGGHCEKGVCICRK TSFKDLWDKYF	105	Fujiwara *et al.* (1990)
Sarcotoxins	Sarcotoxin IA	GWLKKIGKKIERVGQHTRDA TIQGLGIAQQAANVAATAR*	106	Okada and Natori (1985b)
	Sarcotoxin IB	GWLKKIGKKIERVGQHTRDA TIQVIGVAQQAANVAATAR*	107	Okada and Natori (1985b)
Seminal plasmins	Seminalplasmin	SDEKASPDKHHRFSLSRYAKL ANRLANPKLLETFLSKWIGDR GNRSV	108	Reddy and Bhargava (1979)
Tachyplesins	Tachyplesin I	KWCFRVCYRGICYRRCR*	109	Nakamura *et al.* (1988)
	Tachyplesin II	RWCFRVCYRGICYRKCR*	110	Muta *et al.* (1990)
Thionins	Thionin BTH6	KSCCKDTLARNCYNTCRFAG GSRPVCAGACRCKIISGPKCPS DYPK	111	Bohlmann *et al.* (1988)
Toxins	Toxin 1	GGKPDLRPCIIPPCHYIPRPKP R	112	Schmidt *et al.* (1992)
	Toxin 2	VKDGYIVDDVNCTYFCGRNA YCNEECTKLKGESGYCQWAS PYGNACYCKLPDHVRTKGPG RCH	113	Bontems *et al.* (1991)

*Argiolas and Pisano, *JBC* 259:10106 (1984); Argiolas and Pisano, *JBC* 260:1437 (1985); Banerjee and Hansen, *JBC* 263:9508 (1988); Bellamy *et al.*, *J. Appl. Bacter.* 73:472 (1992); Bernheimer and Rudy, *BBA* 864:123 (1986); Bohlmann *et al.*, *EMBO J.* 7:1559 (1988); Bontems *et al.*, *Science* 254:1521 (1991); Bulet *et al.*, *JBC* 266:24520 (1991); Bulet *et al.*, *Eur. J. Biochem.* 209:977 (1992); Bulet *et al.*, *JBC* 268:14893 (1993); Casteels *et al.*, *EMBO J.* 8:2387 (1989); Casteels *et al.*, *Eur. J. Biochem.* 187:381 (1990); Cociancich *et al.*, *BBRC* 194:17 (1993); Creighton and Charles, *J. Mol. Biol.* 194:11 (1987); Csordas and Michl, *Monatsh Chemistry* 101:82 (1970); Diamond